

Orthodontic Management of Spaced Dentition in a Periodontally Compromised Adult Patient: A Case Report

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Abstract

Background: The primary purpose of orthodontic management is to achieve a proper relationship and good harmony between the teeth and the facial structures. Nowadays, facial attractiveness has a significant impact on someone's overall look, and it is well acknowledged that orthodontic treatment will affect facial proportion. **Objective:** The purpose of this case report was to highlight the orthodontic management of an adult patient who had spaced and proclined dentition as well as an unaesthetic smile arc. **Case:** A 35-year-old female was concerned about her unaesthetic smile due to the presence of spaced and proclined dentition at both the upper and lower arches. A bilateral Class I molar, incisor, and canine relationship with severe spacing, proclination was observed during an intraoral examination. Skeletal Class I association with a hypodivergent facial pattern and orthognathic maxilla and mandible was identified after cephalometric analysis. Orthodontic treatment was started with non-extraction treatment planning. The patient felt very confident and happy with the treatment outcome after achieving optimal arch coordination with good facial harmony. **Conclusion:** Overall effective treatment with a good esthetic, functional, and stable results was achieved with great satisfactory outcome.

Keywords: Spacing, Proclination, Orthodontic treatment, Unaesthetic smile

INTRODUCTION

Orthodontic fixed appliance treatment may drastically modify and improve the facial appearance while also addressing dental abnormalities in the modern day. After Class II malocclusion, prevalence of Class I malocclusion is the highest.^[1-4] Spaced and proclined dentition is a frequent anterior segment malocclusion that can arise between any tooth and must be corrected to produce the attractive smile that everyone desires. Over the past several decades, there has been an increase in awareness of orthodontic treatment understanding, which has resulted in a rising number of people anticipating high-quality treatment in the shortest period of time, with enhanced efficiency and cheaper expenses.^[5-8]

Class I malocclusions can be treated in a variety of methods, depending on the features of the condition or malocclusions, such as anteroposterior disproportion, age and maturity level, and patient compliance.^[9-11] Historically, the indications for extraction considerations and their rationale in orthodontic practice have been a point of controversy.^[12-15] The other hands, in growing patients correction of Class I malocclusions, can be done with dental camouflage to mask the skeletal discrepancy and disproportions, which

might entail either non-extraction retraction using available spaces or with extractions of premolars.^[16,17] Extraction of two premolars was suggested in the case of cephalometric discrepancy in the mandibular arch or in the cases of crowding.^[18-23] Fortunately, good satisfactory outcomes with a remarkable degree of correction can be obtained in some cases without the need of extraction of permanent premolars. This case report illustrates how a non-extraction fixed orthodontic treatment was used to address a Class I malocclusion in an adult female patient with spaced and proclined upper and lower anterior teeth with a maxillary midline diastema, shifted dental midline, and unaesthetic smile arc. The non-extraction procedure described in this article demonstrates how an unattractive smile may be transformed into an attractive and pleasurable one with conventional fixed orthodontic mechanotherapy that does

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not require any extractions by just utilizing the existing available spaces.

CASE REPORT

Extra-oral examination

A 35-year-old female patient reported for treatment with the major complaint of spacing and forwardly placed upper and lower front teeth and concerned about unaesthetic appearance of smile. Extra-oral examination revealed that the patient had mild convex facial profile, a grossly symmetrical face on both sides, potentially competent lips, a moderately deep mentolabial sulcus with mesomorphic body, mesoprosopic facial form, a mesocephalic head form, and average nose and mouth width (Figure 1).

There was no significant prenatal, natal, or postnatal history, habit history, or family history for the patient. There was dental proclination, generalized spacing, upper dental midline was shifted toward the right side, and maxillary midline

diastema while smiling. The patient had a toothy smile and an unaesthetic smile arc. The patient was really uncomfortable with her smile (Figure 2).

Intra-oral examination

An intra-oral examination in the frontal view revealed an increased overjet and averaged overbite with non-coincident dental midlines. The patient's upper dental midline was shifted to the right by 2.5 mm. Generalized spacing, dental proclination in the upper and lower anterior region and maxillary midline diastema was present. In lateral view, the patient had a Class I incisor, canine, and molar relationship (Figure 3).

Radiographic evaluation

A lateral cephalogram revealed significant proclination in the upper and lower teeth with an average toward horizontal growth pattern. OPG revealed the existence of all fully erupted third molars, loss of interdental alveolar bone in the anterior and posterior regions, and well-positioned condyles devoid of anomalies. The presence of a spaced dentition and the lack of root parallelism are also seen on the OPG. On soft-tissue radiographic examination, as per E-line, H-line, and S-line both upper and lower lips were found to be protrusive (Figure 4).

Diagnosis

On clinical and radiographical diagnosis, this 35-year-old female patient showed skeletal maturation in CVMI stage VI with angles Class I malocclusion on skeletal Class I bases,



Figure 1: Pre-treatment extra-oral (a) frontal and (b) right lateral



Figure 2: Pre-treatment extra-oral smiling (a) frontal and (b) oblique

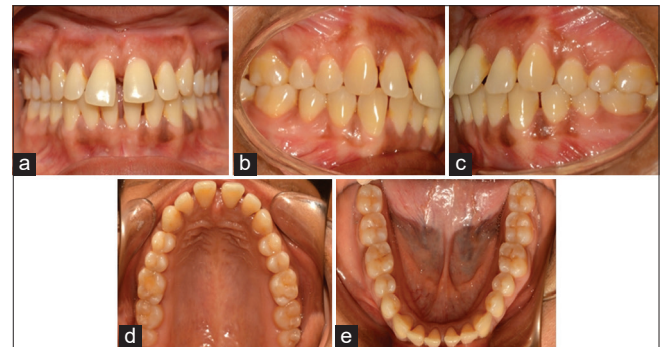


Figure 3: Pre-treatment intra-oral photographs (a) frontal, (b) right lateral, (c) left lateral, (d) maxillary occlusal, and (e) mandibular occlusal

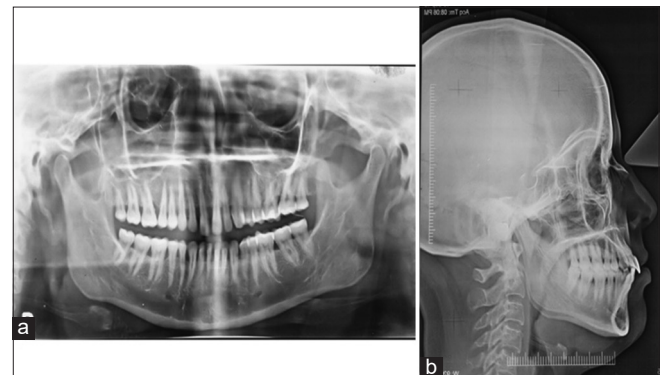


Figure 4: Pre-treatment radiographs (a) OPG and (b) lateral cephalogram

with orthognathic maxilla and mandible, and an average toward horizontal growth pattern. The features include, dental proclination and spacing in the upper and lower anteriors, as well as upper midline diastema, non-coincident dental midlines, increased overjet, a relatively deep mentolabial sulcus, and potentially competent lips with increased lip strain.

List of problems

Hard tissue

1. Severe dental proclination of the upper and lower anteriors.
2. Spacing in maxillary and mandibular anterior teeth.
3. Increased overjet due to proclination of anteriors.
4. Maxillary midline diastema.
5. Non-coincident dental midlines.

Soft tissue

1. Protrusion of the upper and lower lips.
2. Lips were potentially competent.
3. Increased lip strain.
4. Convex facial-profile of the patient.

Treatment objectives

The treatment objectives were as follows:

1. To correct proclination and spacing in maxillary and mandibular anterior teeth.
2. To correct maxillary diastema.
3. To decrease the lip strain.
4. To decrease the overjet.
5. To correct the upper dental midlines.
6. To maintain Class I incisor, canine, and molar relationship.
7. To achieve an attractive and pleasing smile.
8. To achieve orthognathic facial profile.

Treatment plan

Taking into consideration of patient's profile along with clinical and radiographical findings, orthodontic fixed appliance mechanotherapy was started with the decision of non-extraction treatment protocol. Bonding of maxillary and mandibular teeth up to second molars was done using MBT 0.022 × 0.028" slot bracket. Initial leveling and alignment were done with 0.014" Copper Niti, followed by 0.016" Copper Niti arch-wire. Spacing in the anteriors segment was consolidated on 0.018" round stainless steel wires with the help of elastomeric chains from canine to canine, generating light continuous forces, and required to be changed every 4 weeks due to force degradation property and a decrease in activity. To prevent excessive bite deepening effect during the space consolidation and retraction phase, heavy archwires were used and reverse curve of spee was incorporated in it. Followed by 0.019" × 0.025" rectangular Copper NiTi, followed by 0.019" × 0.025", rectangular stainless steel wires were used (Table 1 and Figure 5).

Light retraction forces were used to maintain anchorage in both maxillary and mandibular arches, also by monitoring of the molar and canine relations on every visit. Laseback and bendback were also given for anchorage considerations in maxillary and mandibular arch to maintain a Class I incisor,

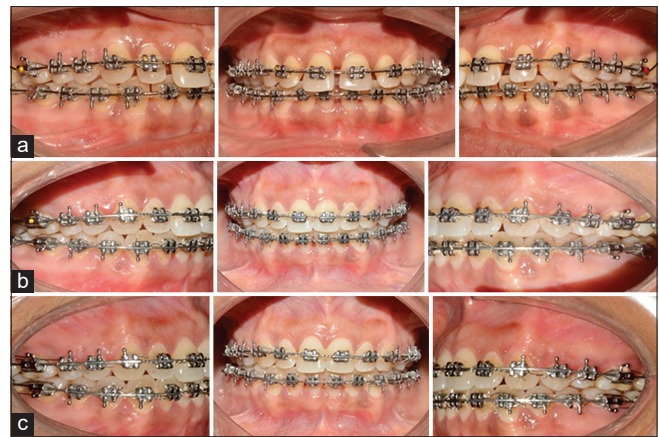


Figure 5: (a) Space consolidation 0.018" SS archwire, (b) 0.019 × 0.025 copper NiTi archwire in the upper and lower arch, and (c) 0.019 × 0.025 SS archwire in the upper and lower arch

canine, and molar relationship. Inter-proximal reduction was performed to remove black triangles between lower anteriors and between upper laterals and canines on both sides. Finishing, settling, and final detailing with 0.014" round stainless steel wires were done, uprighting bend was incorporated in the wire to upright left central incisor (Figure 6). The facial profile improved significantly at the end of treatment, thus improving the patient's confidence even further. There was improvement in occlusion, smile arc, profile at the end of the treatment (Figures 9-11). For retention purpose, Essix retainers as well as lingual bonded retainers were given in the upper and lower arch. Figure 7 illustrates pre- and post-treatment superimpositions, and Figure 8 shows post-treatment radiographs.

DISCUSSION

Tooth movement is greatly influenced by growth and development in the adolescent stage, however, in the adult, we just deal with tooth movement alone. Furthermore, orthodontic treatment in adults is frequently based on symptoms identified by the patient itself, but in children, it is more frequently based on signs noticed by clinicians or guardians. Equally significant is the fact that adults seek dental treatment for esthetic purposes more frequently, and so are more prone to have unrealistic expectations about the outcome of the treatment, and are less adaptive to the appliance, and therefore more uncompromising in his judgment of the treatment outcomes. It is quite challenging to treat a proclined and spaced Class I malocclusion in an adult patient without extraction of the premolars.

The most reliable approach to get predictable outcomes with minimum side effects is to follow a well-chosen individualized treatment plan that is carried out using good biomechanical principles and adequate regulation of orthodontic mechanics.

Any combination of skeletal and dental components might be present in a Class I malocclusion. As a result, diagnosing



Figure 6: Finishing, detailing, and setting of the treatment (a) uprighting bend for the left central incisor, (b) IPR in the lower anteriors, and (c) triangular setting elastic

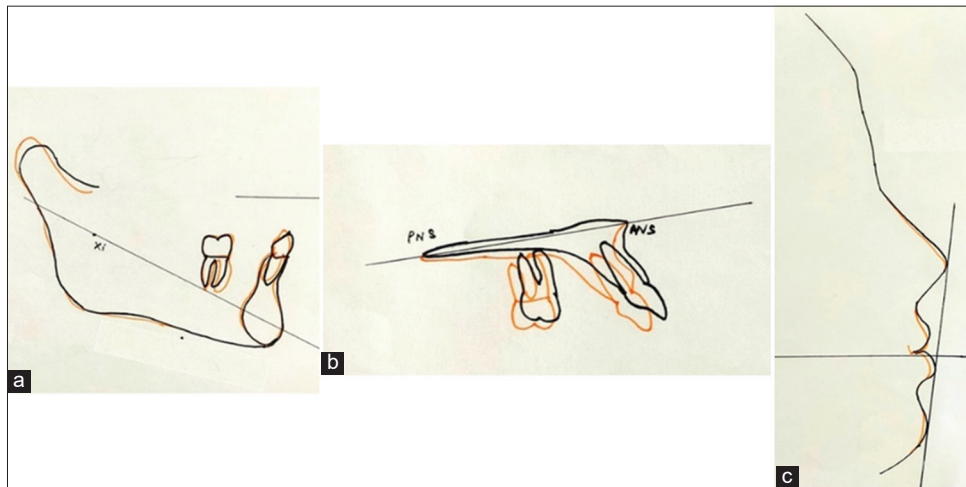


Figure 7: Pre-treatment (Black color) and post-treatment (Red color) superimposition (a) mandibular superimposition, (b) maxillary superimposition, and (c) facial profile superimposition

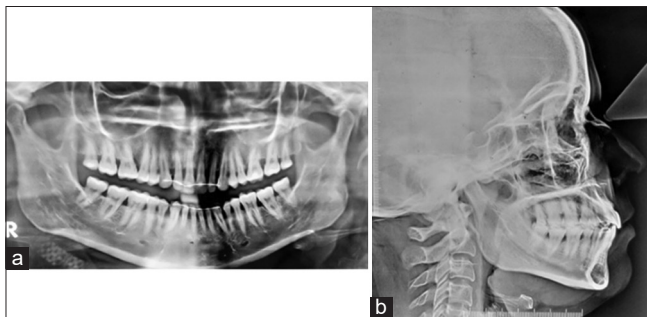


Figure 8: Post-treatment radiographs (a) OPG and (b) lateral cephalogram



Figure 9: Post-treatment extra-oral (a) frontal and (b) right lateral



Figure 10: Post-treatment extra-oral smiling (a) frontal and (b) oblique

and interpreting the etiology and manifestations of Class I malocclusion is very important for their management. The patient's primary concern was spaced and proclined upper and lower front teeth, for which she needed treatment. The decision to treat the case non-extraction is the key component to emphasize here. After thoroughly analyzing the case and pretreatment cephalometric parameters, as well as clinically evaluating the patient's profile, the decision was made to proceed with the treatment without extracting the first premolars because the patient presented with spacing and the existing spaces would be sufficient to correct

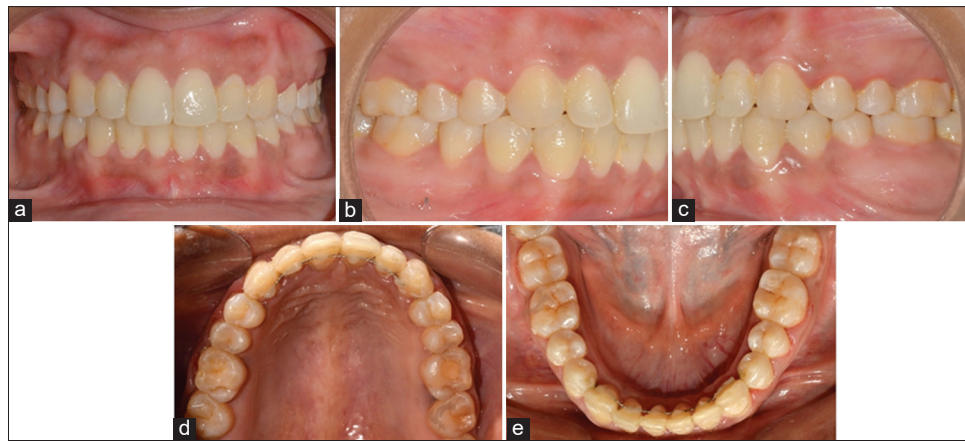


Figure 11: Post-treatment intra-oral photographs (a) frontal, (b) right lateral, (c) left lateral, (d) maxillary occlusal, and (e) mandibular occlusal

Table 1: Pre diagnostic measurements

S.no.	Measurements	Normal Value	Pretreatment	Post-Treatment
1.	SNA	82°	81°	83°
2.	SNB	80°	79°	81°
3.	ANB	2°	2°	2°
4.	Facial Axis	90°	93°	92°
5.	Y-Axis	59.4° (53-66)	54°	57°
6.	UI-SN	102°	110°	106°
7.	UI-NA	22° 4 mm	38°, 7 mm	22°, 4 mm
8.	UI- N Pog	2 mm	11 mm	8 mm
9.	LI- FH	65°	52°	60°
10.	LI-MP	90°-95°	106°	99°
11.	LI- NB	25°, 4mm	37°, 8 mm	28°, 5 mm
12.	LI- Npog	-2 to +2 mm	7 mm	6 mm
13.	LI- NA	0 mm	3 mm	0 mm
14.	E-line – Upper lip	-2 mm	-2 mm	-3 mm
15.	E-line – Lower lip	-4 mm	0 mm	-2 mm
16.	S-line – Upper lip	0 mm	0 mm	0 mm
17.	S line – Lower lip	0 mm	+2 mm	0 mm
18.	H-line	-1 to +1	+2 mm	+1 mm

the spaced anterior teeth. At the end of the treatment, all treatment objectives are completely achieved and patient's profile significantly improved. Within specified time frame, successful and satisfactory treatment outcome were achieved after the fixed pre-adjusted edgewise appliance treatment. The profile and smile of this 35-year-old female patient improved tremendously after this active treatment period, as seen in the post-treatment extra oral photographs. After that, Hawley's retainers as well as fixed lingual bonded retainers were given for both maxillary and mandibular arches. At the end of treatment, the patient was pleased and satisfied with the treatment's outcomes.

CONCLUSION

We could achieve considerable and satisfactory outcomes with appropriate case selection, planning, and good patient cooperation. This case report describes how an adult patient

with spaced and proclined dentition may be treated without extraction of premolars with proper use fixed orthodontic treatment and effective anchorage preservation. Anticipated treatment goals were successfully achieved. The patient's smile and facial profile significantly improved, and the patient's esthetics and self-esteem improved significantly.

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